

# Microwave Detection of Laser Ultrasonic for Non-Destructive Testing, Phase II

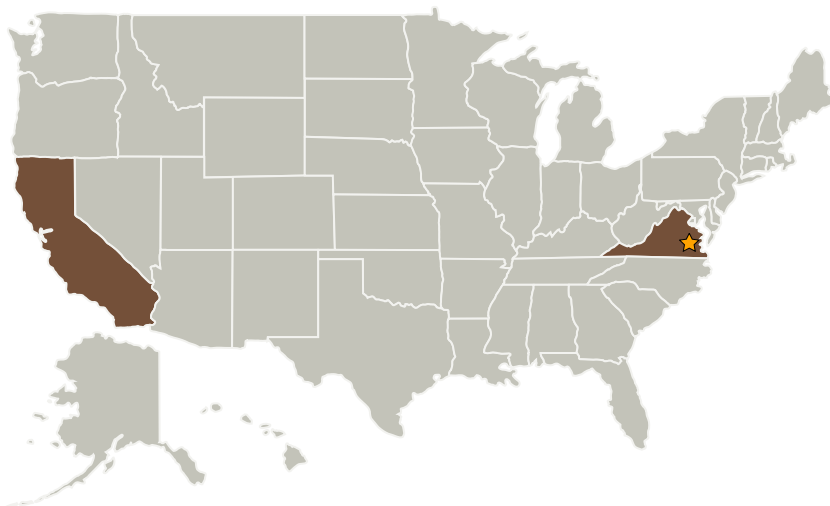
Completed Technology Project (2008 - 2010)



## Project Introduction

In this proposal, we describe a program to develop a high-performance, cost-effective and robust microwave receiver prototype for multi-purpose Non-Destructive Evaluation (NDE). Currently, NDE of space transportation vehicles is primarily carried out on the ground, between missions. For future space missions, as duration and frequency increases, more inspection will need to be performed in space in order to monitor the aging process of the structure and to insure its integrity. For this purpose, NDE equipment that is compact, lightweight, easily operated by human with limited mobility or robot, and that exhibits low power consumption is required. Furthermore, in order to minimize the quantity of embarked equipment, the inspection equipment must be able to perform as many different inspection tasks as possible. Our innovative receiver is based on the integration of a microwave interferometer coupled with a pulsed laser to generate the ultrasound. . Based on the results obtained during Phase 1, we strongly think that we will be able to overcome the limitation generally associated with classical optical receiver: 1) Inability to work in factory environment where thermal, mechanical and optical propagation (fumes, water drops,...) perturbations are present; 2) Reduction in sensitivity caused by the speckle nature of the light reflected from rough surfaces; 3) High system cost due the price of the probe lasers, optics and engineering to develop an optical system working in a harsh environment (fumes, water drops, strong mechanical vibration) and 4) high maintenance cost (Lasers and optics need to be checked and re-aligned frequently). Our proposed approach will lead to a cost-effective prototype with good sensitivity and performances in industrial environment.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Langley Research Center (LaRC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center (LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Bossa Nova Technologies, LLC	Supporting Organization	Industry	Venice, California

## Primary U.S. Work Locations

California	Virginia
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## Project Transitions

**June 2008:** Project Start**June 2010:** Closed out

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX14 Thermal Management Systems
  - └ TX14.2 Thermal Control Components and Systems
  - └ TX14.2.5 Thermal Control Analysis